SCIENCE NEED STATEMENT

Monitoring of Contaminants-- Chemical Indicators of Remedial Technology Processes

Identification No.: RL-SS36-S
Date: September 2001

Program: Environmental Restoration
OPS Office/Site: Richland Operations Office/Hanford Site
Operable Unit(s): Broad need potentially applicable to multiple operable units.
PBS No.: RL-SS04 (RL-VZ01)
Waste Stream: Groundwater (Disposition Map Designation: ER-10 [technical risk score 5] and ER-18 [technical risk score 5]), Soil (Disposition Map Designations: ER-04 [technical risk score 3], ER-14 [technical risk score 5], ER-03 [technical risk score 3])
TSD Title:
Operable Unit (if applicable): N/A
Waste Management Unit (if applicable): N/A
Facility: N/A

***Priority Rating*:**

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" Priority: Select a "1", "2" or "3" to assess the impact of the need/opportunity relative to the current site baseline.

_X__ 1. Critical to the success of the ACPC
____ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
____ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

***Need Title*:** Monitoring of Contaminants-- Chemical Indicators of Remedial Technology Processes

Need/Opportunity Category: Science Need

***Need Description*:** For Hanford site-specific conditions, identify the species that form during a remedial technology process (chemical, physical, and/or biological) and are indicative of key reactions that make the technology work. Determine concentrations of key species that represent the endpoint(s) of the technology process.

Science needs include measuring the rates of reactions fundamental to the operation of remedial technologies, and identifying the species and concentration indicative of the endpoint of the reactions and therefore the remedial processes. Information is needed for current remedial approaches and for those approaches being demonstrated at pilot scale, such as in-situ redox manipulation to reduce contaminants such as chromate, uranium, and chlorinated hydrocarbons.

Schedule Requirements:

Earliest Date Required: 8/1/99

Latest Date Required: 9/30/15

***Problem Description*:** Some of the remedial technologies that are identified for implementation at Hanford call for the introduction of chemical or biological materials to the subsurface. These materials will cause reactions in the groundwater system that are aimed at reducing or transforming the contaminant plumes. To assess performance of the remedial technologies and determine whether an endpoint has been reached, measurements of different chemical species will be made. Feasibility studies for remedial alternatives will have identified key important reactions for the different technologies. It will be important to know which species are indicative of endpoints for the chemical reactions involved in the technology. For example, if reduction and immobilization of chromate to chromium (IV) is part of a remedial technology, it will be important to know when the concentration of chromate drops below the necessary target level as an indication that the end of the process has been reached.

Benefit to the Project Baseline of Filling Need: If the science needs are filled, then it will be possible to design and implement a post-closure monitoring plan that adequately assesses technology performance and can be used to determine when a remediation is complete. Use of in-situ monitoring technology for endpoint concentrations will reduce risk to human health and provide cost savings.

Benefit code: check all that apply:

- ✓ Cost Savings
- ✓ Risk Reduction
- ✓ Enabling Knowledge (i.e., solves a problem that cannot be remediated by current science/technology)

This Science Need also supports the following Hanford Subsurface Contaminant Technology Needs:

RL- SS01
Cost-effective, In-situ Remediation of Carbon Tetrachloride in the Vadose Zone and Groundwater

RL- SS03
Improved, Real-time, In-situ Detection of Carbon Tetrachloride in Groundwater

RL- SS04
Cost-effective, In-situ Remediation of Hexavalent Chromium in Groundwater

RL- SS06
Improved, Real-time, In-situ Detection of Hexavalent Chromium in Groundwater

RL- SS07
Cost-effective, In-situ Remediation of Strontium-90 in Groundwater

RL- SS09
Improved, Real-time, In-situ Detection of Strontium-90 in Groundwater

RL- SS11
Cost-effective, In-situ Remediation in the Vadose Zone of One or More of the Following Heavy Metals: Hexavalent Chromium, Mercury, Lead

RL- SS12
Cost-effective, In-situ Remediation in the Vadose Zone of One or More of the Following Radionuclides: uranium, plutonium, cesium, cobalt, and strontium-90

RL- SS15
Improved, In-situ Characterization to Determine the Extent of Soil Contamination of One or More of the Following Heavy Metals: Hexavalent Chromium, Mercury, Lead

RL- SS16
Improved, In-situ Characterization to Determine the Extent of Soil Contamination of One or More of the Following Radionuclides: uranium, plutonium, cesium, cobalt, and strontium-90

Relevant PBS Milestone: PBS-MC-042

End-User: Richland Environmental Restoration Project

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